Managing footrot in sheep: an update

INTRODUCTION

In 2011 the Farm Animal Welfare Council proposed that by 2021 the prevalence (level) of lameness in a flock of sheep should average less than 2%. This is already possible using the considerable amount of research into lameness and footrot in particular that has occurred in the UK since 2000. The average prevalence of lameness has already fallen as farmers adopt new recommended managements: in 2004 the average prevalence of lameness was 10.2%, by 2013 this had fallen to 3.5%. In this article we summarise the current recommended approaches to diagnose, treat and control footrot in sheep and highlight that routine foot trimming is an unnecessary and potentially harmful procedure currently contributing to up to 42% to the prevalence of lameness in some flocks. Where farmers practise the recommended managements the prevalence of lameness falls to <2%.

DIAGNOSIS VERSUS NAMING LESIONS THAT CAUSE FOOT LAMENESS

Farmer naming of the causes of lameness

Sheep farmers are very good at recognizing lame sheep and estimate the flock prevalence of lameness with reasonable accuracy, however, they tend to name any damage to the hoof horn as footrot (Kaler and Green 2008). There are six common causes of foot lameness in sheep in Great Britain (Figure 1) and farmers do recognize the different causes despite referring to them as ‘footrot’ or ‘severe footrot’. Sheep farmers tend to only talk to their vet when they have a problem with

lameness that they cannot resolve, and often talk to their vet by phone rather than having the vet examine their sheep. So a key issue with mis-naming lesions can be incorrect guidance from vets on managing a lameness problem. This is particularly of concern for an outbreak of contagious ovine digital dermatitis (CODD) because the outbreak could be quite advanced before a correct diagnosis is made. When a farmer has a problem with lameness we recommend that the vet examines some sheep. To encourage this, initially, farmers could send photographs typical of the lesion (very easy now with smart phones). In addition, we have produced a flow diagram in collaboration with the AHDB Beef & Lamb Better Returns Programme to help correct naming and treatment of common foot lesions (Figure 1).

Figure 1

Box 1

Interdigital dermatitis and severe footrot are one disease

Interdigital dermatitis (ID or scald) and severe footrot (see Box 1 for clinical descriptions) are two clinical presentations of one disease, footrot. Both ID and severe footrot are caused by *Dichelobacter nodosus*. Evidence for this comes from research that showed that the number of *D. nodosus* on sheep feet increases before ID occurs and remain high through ID and as severe footrot develops. In fact, feet with ID have the highest numbers of *D. nodosus* and this is therefore a highly infectious stage of footrot (Witcomb and others 2014) as the *D. nodosus* are shed onto pasture / bedding and spread to other sheep.

Because ID and severe footrot are one disease, greatest control is obtained by managing them together. Farmers have reported anecdotally that as they gained control over footrot in adult sheep, they have fewer outbreaks of ID in spring; and eventually no outbreak occurred. Footrot accounts for 70 – 80% of all sheep lameness in the national flock and so, for most flocks, control of footrot drives the prevalence of all lameness to very low levels.

Box 2

Figure 2

TREATMENT OF SHEEP WITH FOOTROT

Traditionally the recommended treatment for footrot was to trim the foot to open the lesion, and then spray with a topical antibiotic. There was no evidence that this is an appropriate treatment. In a clinical trial that investigated several treatments for footrot, only 10% of sheep treated by trimming and antibiotic foot spray recovered in 5 days and only 25% in 10 days. In contrast, 70% of ewes with footrot treated with parenteral and topical antibiotics without trimming hoof horn recovered in 5 days and >95% recovered in 10 days (Kaler and others 2010). Trimming feet of sheep given parenteral antibiotics slowed the rate of recovery by half (Figure 3). In conclusion, foot trimming feet with footrot delays recovery from lameness and lesions, and is therefore not recommended. See Box 3 for best practice to treat footrot.

Figure 3

Box 3

Box 4

AN IMPORTANT NOTE ON ROUTINE FOOT TRIMMING

Routine foot trimming is unnecessary and should be avoided

Routine foot trimming the flock once or twice a year was recommended for decades in Great Britain. Over 40% of sheep farmers do not practise routine foot trimming; it is hard work and time consuming and at best does no harm, at worse, it increases the prevalence of lameness. Routine foot trimming is associated with higher prevalence of footrot and CODD (Dickins et al., 2016) and overall lameness; recent research has highlighted that when feet bleed at routine trimming flock prevalence of lameness is higher (Winter and others 2015). Foot trimming which damages sensitive tissue can cause granulomas (Figure 4). This condition is difficult to treat and often results in chronic lameness; affected sheep are likely to get footrot repeatedly and so are a source of infection for the rest of the flock. Sheep with granulomas are in pain and poor welfare; they often have to be culled and are therefore a waste of resources.

Figure 4

What happens if feet are not routinely trimmed?

Hoof horn grows continually and wall horn length is affected by moisture and temperature. Horn is longer in wetter periods when ground is soft such as housing, spring and autumn because it not worn away, but horn wears away when the ground is harder in summer and winter (Figure 5; Smith and others 2014). One farmer who housed his pedigree sheep for several months over winter and who

stopped routine foot trimming said ‘ewes are turned out with long toes and come in with short toes’. Some farmers and vets believe that longer hoof horn makes sheep more susceptible to footrot, when in fact longer horn actually occurs after footrot has developed because the sheep stops weight bearing on that foot (Figure 6). Foot trimming is not necessary because once treated, the sheep weight bears and naturally wears away the overgrown horn distal to the sole.

We recommend that routine foot trimming is not practised; it is not part of prevention of lameness in sheep. It may be necessary to trim individual animals e.g. for shows, this should be viewed as a pedicure for visual presentation.

Figure 5

Figure 6

Box 5

WHOLE FLOCK CONTROL MEASURES

The whole flock control measures detailed below reduce the number of sheep becoming lame with footrot and therefore needing treatment.

Prompt treatment of lame sheep

Correct diagnosis and rapid treatment of individual lame sheep is the most essential activity to control footrot. Footrot is an infectious disease and treatment within three days of onset of lameness reduces transmission of *D. nodosus* to susceptible sheep. Many farmers have achieved <2% prevalence of lameness using this practice

alone. Farmers who treat mildly lame sheep within three days of onset of lameness have lower prevalence of lameness than those who delay treatment until sheep are more severely lame, typically also waiting for several sheep in a group to be lame, before treating them. Treating disease lesions promptly also prevents progression to severe footrot that affects health and welfare. Treating lame sheep within 3 days can be practically difficult for farmers, and suggesting checking a third of the flock per day may sometimes be the best approach. Remarkably, sheep lame for only a week have reduced productivity (Box 6).

Box 6

Internal biosecurity

Separation of individual sheep with footrot

As well as rapid treatment, separating sheep with footrot from the main flock lowers the prevalence of footrot. For farmers with sheep in pockets of land it is often easier to bring lame sheep back to the farm to treat them. These sheep can be returned to the flock once they have recovered. Separating lame sheep throughout the year has greatest impact on reducing the prevalence of lameness; it is challenging at some times of year e.g. with young lambs at foot, although if ewes are not turned out lame lameness can be avoided at this time. There is, therefore, huge benefit from separating sheep with footrot from sound sheep at high-risk periods. These are housing, when bedding and warmth are ideal for spread of *D. nodosus,* and turnout, when avoiding putting lame ewes with young lambs will help prevent outbreaks of ID. Housing and lambing can be high stress periods and so working with a farmer to

decide where lame ewes can be grouped separately before these busy periods encourages this management.

Many farmers like to take a break after weaning and 'ignore' ewes until just before tupping, but this is an ideal time to focus on treatment of a separate group of lame ewes, which are easier to treat and monitor. This also prevents lameness in the healthy ewes, which helps them gain condition. Ewes that do not respond to treatment can be culled, see below.

The role of culling repeatedly lame ewes in a lameness control programme

At the start of a lameness control programme, culling persistently lame sheep – typically those with granulomas or very badly mis-shapen feet – reduces the flock prevalence of lameness rapidly. Separation, treatment and monitoring differentiate the slow responders from those that can be returned to the flock and even sheep culled for lameness must be fit to be transported. Once a strategy of prompt antibiotic treatment of sheep with footrot, no foot trimming and good external biosecurity is in place, repeatedly and persistently lame sheep are rare, minimizing culling to a very few sheep in a flock.

Accurate record keeping is important to identify repeatedly lame ewes. Farmers who rely on memory have a higher prevalence of lameness (Winter and others 2015) suggesting they either cull the wrong ewes or do not cull sufficiently. A highly persistent spray marker at the top of affected limb is sufficient for commercial flocks but farmers breeding replacements need a written record of the ear tag number /

electronic ID to select replacements from non-lame parents (see role of genetic selection below).

It is often recommended that sheep that have been lame twice should be culled. Many farmers are reluctant to cull lame sheep, and in some situations this approach could result in culling large numbers of sheep. Using separation and treatment of lame animals and only culling slow responders may be a more sensible strategy.

The role of vaccination and genetic selection

Vaccination against footrot and genetic selection both reduce the susceptibility of sheep to footrot. The commercially available vaccine (Footvax, MSD Animal Health) contains nine of ten serogroups of *D. nodosus*; the serogroup not included has not yet been identified in Great Britain. The manufacturers state that the vaccine should be used as part of a comprehensive control programme for footrot, not as a sole measure because efficacy is relatively low and protection lasts 4 – 6 months. Anecdotally some farmers report good results following vaccination whilst others report little or no benefit. Vaccination might be a useful tool at the start of a lameness control programme if the prevalence of footrot is sufficiently high for it to be cost effective in combination with prompt individual treatment of lame sheep and other recommendations above. However, vaccination is not always necessary: many farmers have a lameness prevalence of <2% without using vaccination.

Very few (4%) farmers in Great Britain select replacement breeding stock from non-lame parents, however, this practice was associated with lower prevalence of lameness in our 2013 study (Table 1). As footrot prevalence reduces within a flock, such selection becomes less feasible as reduced disease challenge makes it difficult to differentiate resistant and susceptible sheep.

The limited role of footbathing

Footbathing is a useful tool to treat outbreaks of ID, and as a preventive measure, for example, after gathering a group of sheep. Footbathing does not treat severe footrot, and on farms where this is used as the key management rather than individual rapid treatment, the prevalence of lameness is high (Winter and others 2015). Footbaths contain disinfectants that kill bacteria present on the surface of the foot, so they reduce the pathogen load on the feet. These disinfectants do not have sufficient activity or tissue penetration to have efficacy for under-running lesions. There is no reason to believe unlicensed antibiotic solutions would be any more effective than disinfectants, and because of the concentration of antibiotic used they contribute to high antibiotic use in sheep flocks and increase risk of antimicrobial resistance.

Box 7

External biosecurity

Good external biosecurity reduces the prevalence of footrot. Buying in sheep, poor boundary fencing, neighbouring sheep flocks, shared grazing and showing sheep are all associated with higher prevalence of lameness (Winter and others 2015). Even though footrot is in most flocks (at least 97%), farmers who quarantine new and

returning stock for >3 weeks and ensure sheep are free from signs of footrot before entering the main flock have a lower prevalence of lameness. This is because quarantine prevents introduction of new strains of *D. nodosus* to a flock; the flock will not be resistant to a new strain and so will become lame. Quarantine is also a valuable tool to reduce the risk of introduction of many other infectious diseases.

Box 8

Figure 7

Box 9

WILL TREATMENT AND CONTROL OF FOOTROT AS DESCRIBED INFLUENCE PRESENCE AND PREVALENCE OF CONTAGIOUS OVINE DIGITAL DERMATITIS?

Very usefully, many of the recommended biosecurity and treatment approaches to control footrot are also effective for control of CODD (Dickins and others 2016). Approximately 58% of flocks in England have CODD, with an average within flock prevalence of 2.8%. Flocks are less likely to have CODD if they followed the external biosecurity practices listed for footrot. Flocks with CODD had a higher average prevalence of lameness than flocks without CODD, but in positive flocks, the prevalence of CODD was significantly lower where farmers followed the recommended managements for footrot, that is, they focused on prompt individual treatment of lame sheep with long acting parenteral and topical antibiotics and avoided foot trimming and footbathing.

FARMERS CHANGES IN MANAGEMENT PRACTICES SINCE 2004

The reduction in the prevalence of lameness from 2004 to 2013 matches the uptake of recommended managements by farmers. (Table 1). The percentage of farmers using routine foot trimming or trimming as part of treatment for footrot has fallen dramatically. In addition, the number of farmers always using antibiotic to treat footrot has more than doubled, although this number still remains relatively low at 24%. There are a large number of farmers who sometimes use antibiotic (>50%). Farmers are sometimes reluctant to alter their management and consider antibiotics expensive and have concerns about their use (Box 4). Suggesting a trial of the new recommendations on a small number of sheep can often be effective, quite a few farmers have convinced themselves by testing our recommendations in their flock e.g. by trying the new recommended treatment on the next three sheep that are lame and the traditional treatment on the following three sheep. If farmers report that long-acting oxytetracycline is ineffective it is worth checking that they are not under-dosing, which does lead to failure in recovery.

Table 1

CONCLUDING REMARKS

The key to successful management of footrot is to minimize the spread of bacteria between individuals within the flock. Prompt and appropriate treatment of individual lame sheep is therefore vital, and separation and, when necessary, culling removes sheep that are a significant source of *D. nodosus* and protects the main

flock. In addition, good biosecurity prevents introduction of new strains of *D. nodosus*. Trimming the feet of sheep should be avoided: it is of no benefit to control lameness, it delays recovery from lameness in sheep with footrot and trimming into sensitive tissue increases the incidence and prevalence of lameness.

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